THE INHERITANCE OF CERTAIN HUMAN ABNORMALITIES

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THE main object of the Eugenics Education Society is, I conclude, to try and improve the human race by selective breeding. The methods from which success may be expected are two: (1) encouragement of breeding from the fit, and (2) prevention of the propagation of the unfit. Both of these depend on the well-recognised resemblance of children to their parents and both require a complete and accurate knowledge of the laws of Heredity.

Offspring resemble their parents but they also differ from them. The differences may be small and are then commonly known as continuous variations, or very marked, when they are called discontinuous variations or mutations. Experience with animals has shown that improvement may be achieved by selection of the continuous variations for breeding. For instance, we may expect to raise the standard of height by breeding only from exceptionally tall people. The advance to be made by this method is, however, only limited, for while the children of very tall parents tend to be taller than the average they are usually less tall than their parents, that is to say, that there is always a tendency for return to the mean, and to establish and maintain a tall race, selection would have to be very severe and to continue very severe. The advance would be merely in the average height of the individuals and would not progress beyond a certain point, while there would be subsequent difficulty in keeping the average up to the point gained.

Some improvement might be reasonably hoped for in the general average of a race by the encouragement of the breeding

of the fit, and probably much more improvement by the prevention of the propagation of the unfit, but after acknowledging this one is at once met with the practical difficulty of adequately defining who are the fit and the unfit. Success in life affords a rough dividing line, and one may regard the *fit* as those who are capable of maintaining themselves and supporting and educating their offspring. These, the prudent and thrifty, are discouraged by the modern state from begetting children. They are taxed on marriage, the joint income to support two persons being regarded as the income of only one for taxation purposes, whereas if they satisfied their natural inclinations by living in illicit concubinage their incomes would be regarded as separate and possibly each exempt from taxation. Further, each additional child means to this class an added burden, and limits the educational and other opportunities of its brothers and sisters. Thus the natural affection of the parents for their offspring becomes a potent argument for limiting their number.

The other class, the poor and the thriftless, from their nature are not likely to be influenced by considerations such as these: an additional child or two makes little difference to their poverty, and education, being a matter for the state, causes no anxiety. While encouragement might help to bring about an increase in the offspring of the fit, something stronger than discouragement is required to limit the propagation of the unfit. Prevention, the taking away from any two persons the most natural of all their rights—that of having children if they so desire—is a grave measure which requires very strong reasons for its justification. In face of such a proposition our classification of fit and unfit breaks down, for poverty may be combined with many of the qualities that are desirable in a race. To warrant such a drastic measure the parental defects must be very evident, and the exact extent to which they are handed down to the next generation must be very clearly known. The results to be expected from the selection of the smaller continuous variations are certainly not sufficiently marked to warrant such an extensive interference with the liberty of the individual. It is the purpose of this paper to enquire whether the known facts about the inheritance of the larger discontinuous variations are such as to entitle the

community to forcibly prevent certain of the unfit from leaving any progeny.

While in the smaller continuous variations the child tends to blend the characteristics of its two parents, the inheritance of the more marked discontinuous variations is usually particulate and the condition is handed down unchanged from parent to child, or is not transmitted at all. In animals and plants this mode of inheritance has been found to follow certain laws. It is not proposed here to enter into the wide and controversial subject of the theoretical deduction from the facts discovered by Mendel's methods with regard to inheritance and evolution, but merely to point out that if these laws hold in animals and plants, then from the study of certain human abnormalities we know that they also hold in human beings, and for the purposes of this paper may be accepted. Particular attributes may be supposed to be represented by factors, there being a factor for the presence and another for the absence of each attribute. In these pairs of factors one is commonly dominant, *i.e.*, whenever it is existent in an individual that individual shows the presence or absence of the associated attribute, and the other factor is said to be recessive. Since human abnormalities are rare, in the vast majority of cases the individual who shows any particular abnormality is derived from an abnormal parent and a normal one, *i.e.*, has in his composition both the factor for presence and the factor for absence of the abnormality. Usually the factor for presence is a dominant, and hence any individual who carries it exhibits the abnormality in a patent condition. Such an abnormal person marrying with a normal one should theoretically pass on the condition to half his children, the other half being normal. His abnormal children should again transmit the abnormality to half their offspring, while the descendants of the normal children with normal mates should all be normal. Numerous examples of this form of inheritance can be found in human beings. Since human families are small and children are born one at a time at long intervals exact correspondence in numbers with expectation cannot be looked for, but if sufficient families are taken the results come out fairly accurately. For instance, with an abnormal horny condition of the palms and soles the

children of the affected were 238 abnormal and 188 normal, which is a fair approximation to the expected equality. Pure dominants would be expected to appear if two affected individuals married, and all the children of pure dominants, even with a normal mate should be affected. So far only one example of such a marriage is known in human beings—that of two individuals with web-fingers and toes. Two of the children of this marriage had with normal mates families of four and six respectively, every one of whom were affected, and so these two persons were presumably pure dominants.

The prevention of the occurrence of such abnormalities should be an easy affair: all that would be required would be to prevent the affected persons from having children. Most of these abnormalities, however, do not affect the general health nor interfere with the capacity of the individual to earn a living. Still some may lead to early death and so render the state liable for the support of their offspring, or to chronic ill-health. For instance, this is liable to happen in the condition known as Angioneurotic Œdema, where the affected persons are liable to sudden swellings on the skin, or in the throat or elsewhere. None of the abnormalities can be said to be an advantage and some probably interfere with the earning of a livelihood, *e.g.*, the claw-hand deformity, but their rarity renders them of insufficient importance to warrant restriction of personal liberty.

In other classes of abnormalities a further difficulty is introduced by the fact that the dominance is not complete. Here, although an affected person has nearly half his children with a normal mate abnormal and half normal, yet a few of the apparently normal children are liable to transmit the abnormality. As an example one may point to the condition known as Diabetes Insipidus, in which there is an excessive secretion of urine and hence in which abnormal quantities of fluid have to be taken by the mouth. Such an abnormality could only be stamped out with certainty by preventing not only the abnormal but also the normal members of the family from breeding.

A similar, but still greater difficulty would be experienced in tackling the very important sex-limited abnormalities such as Hæmophilia or Pseudohypertrophic Muscular Paralysis. Hæmo-

philia causes the death of most of its exhibitors by the uncontrollable bleeding which results from slight injuries, while Pseudohypertrophic Muscular Paralysis causes such marked deformity that most of its unfortunate victims are incapacitated either for work or for propagating their kind by the time they reach adult life. These are both such terrible afflictions that there is ample justification for stringent measures to save mankind from their ravages. If they were handed down directly from parent to child they would obviously very soon die out, but unhappily it is the males only who suffer, while some of the apparently normal females carry the condition in a latent form and transmit to some of their male children, and through some of their daughters to some of their grandsons and so on. At first sight it almost looks as if there were a special provision for the preservation of these noxious scourges of humanity, especially as the women of bleeder families have an unusually large number of children. The supposition of any such special provision of nature is, however, negatived by the fact that exactly the same mode of inheritance prevails in the harmless condition of colour-blindness. While these two first conditions are sufficiently horrible to warrant special measures for their extermination, the measures required would have to be of such severity that I can imagine no legislature consenting to them. Every woman belonging to an affected family would have to be forcibly prevented from having children, although she herself was perfectly healthy and quite normal in every way, and although only about half of the total number of these women would be expected to have abnormal children. The only possible way of telling whether any female member of these families was free from the family taint would be by her having a large number of normal descendants.

The practical bearing of this discussion of the modes of inheritance of human abnormalities may not seem to be great, but it illustrates the extreme importance of having exact knowledge about the heredity of any condition about which it is proposed to legislate. I have already emphasised the difficulty of defining the unfit, and when one tries to classify them one finds that there is only one class which at all approaches to

definiteness and offers any hope for the application of Eugenic methods. This is the condition which is known as Feeble-Mindedness. There is a considerable body of evidence that this condition is directly inherited from parent to child, and its general aspect suggests that it behaves as a Mendelian dominant. Since the feeble-minded supply a very large proportion of the drunkards, the criminals, the paupers and the prostitutes it would be an obvious advantage to society to have no more of them, and the employment of strong measures to attain this end would be fully justified. On closer investigation, however, we find that our knowledge of the feeble-minded is too vague to permit us to advocate the segregation of this class from a Eugenic point of view. We do not yet know what proportion of feeble-minded persons have had one or more feeble-minded parents, nor how many of them have been born from completely healthy progenitors. Again, we do not yet know what proportion of feeble-minded children are to be expected from the union of a feeble-minded person with a normal mate. The most careful family records, those collected by Tredgold, show that the feeble-minded have in the majority of cases a "neuropathic inheritance," that is to say, that alcoholism, epilepsy and insanity are common in their ancestors, but the records do not show whether these ancestors were alcoholic, epileptic or insane because they were themselves congenitally feeble-minded, though this is not improbable. It would be hopeless to suggest that the insane, the epileptic and the alcoholic must all be prevented from breeding so as to eliminate the feeble-minded. Many individuals have already had offspring before they could be included in these classes, and have often been themselves worthy citizens, who come of healthy stocks and leave desirable children.

In conclusion one must emphasise that at present the scope for the employment of Eugenic methods is small, though much can be done in the way of education and in the acquisition of more exact knowledge. There is hope that by Eugenic methods we may be able to get rid of the greater proportion of the feeble-minded members of our community, but at present our knowledge is insufficient to justify the segregation of this class merely for the benefit of future generations. Fortunately such segrega-

tion is warranted by other arguments. The feeble-minded are better and happier when kept under proper control in institutions and since the majority of them are a constant public menace and expense, being incapable of supporting themselves and often becoming criminals and prostitutes, society is amply justified in permanently depriving them of their liberty. We may hope, that, after the Government have fulfilled their promise of taking proper care of this class, the next generation will see a great diminution in the number of incapable degenerates.